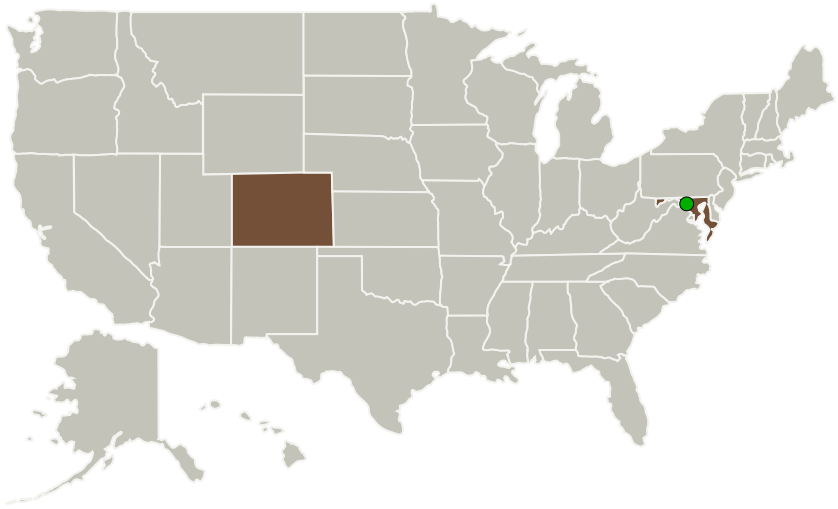
Absolute Wavelength Control of Lasers for Active Sensing in Space, Phase I

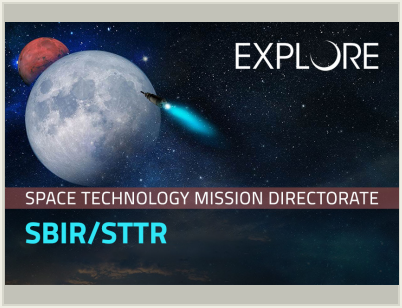
Completed Technology Project (2011 - 2011)

Project Introduction

We propose to develop compact absolute wavelength references to weak molecular transitions, which is a challenge characteristic to space-based active sensing. The ASCENDS mission (Active Sensing of CO2 over Nights, Days, and Seasons) will be the first satellite-based mission employing precision laser spectroscopy for active sensing of molecules in space. Although ASCENDS will be first, it is expected that future NASA missions for planetary sensing or Venture class missions will also use active sensing. In Phase I, Vescent will demonstrate the technology to lock seed lasers to weak molecular transitions in a compact form factor. The final Phase II deliverable will be a complete laser system including a master laser and a slave laser locked to the master laser with a tunable frequency offset. The system will be designed so the slave laser can be used to tune across an O2 transition in a compact instrument designed for flight testing. The phase I effort will bring the technology readiness level to TRL 4. In Phase II we will work with NASA to bring the technology to TRL 6 with fully packaged prototypes and environmental testing.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Vescent Photonics, Inc.	Lead Organization	Industry	Arvada, Colorado
Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Colorado	Maryland

Project Transitions

February 2011: Project Start

September 2011: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137939)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Vescent Photonics, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

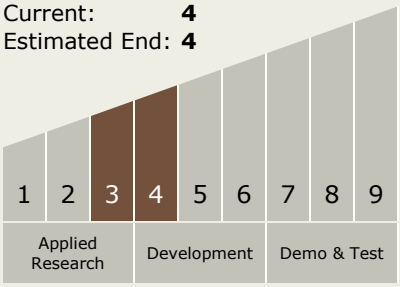
Carlos Torrez

Principal Investigator:

Sara Bickman

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.5 Lasers

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System